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Reports the development of a test designed to predict a student's probable success in analytic geometry. Preliminary estimates indicated that the instrument developed (General Mathematics Test, Form 5) would probably discriminate better between the C and F student than would the tests used previously. The reliability, by the Kuder-Richardson formula, was 0.82.

Analysis revealed that some of the students need (1) more practice in using abstract symbols other than numbers, (2) a better understanding of definitions and relationships, (3) more experience in analyzing a problem and breaking it up into its component parts, (4) more experience in applying information to new situations, and (5) more practice in making associations and in generalizing

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THE DEVELOPMENT OF AN INSTRUMENT TO PREDICT SUCCESS IN ANALYTIC GEOMETRY OF ENTERING COLLEGE FRESHMEN IN ENGINEERING AND THE INDICATION OF SOME POSSIBLE IMPROVEMENTS ADVISABLE IN THEIR SECONDARY SCHOOL MATHEMATICS COURSES.

- Frances Ellura Knights

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In 1955 it was decided at The Pennsylvania State University that freshmen students entering engineering, chemistry and physics, mineral industries, and agricultural engineering should enroll during their first semester for analytic geometry. This necessitated being able to determine which students could pass analytic geometry without first reviewing their high school algebra and trigonometry.

THE PROBLEMS: The problems therefore were to develop an instrument to predict a student's probable success in analytic geometry and as a result of analyzing the data to indicate some possible improvements advisable in some of the students secondary school mathematics courses.

PROCEDURE: Questions were written and 34 were selected by a jury of experts as testing those concepts, understandings, and skills needed for a success in analytic geometry. The teaching experience of the writer and the jury indicated that a student's response, and hence the discriminative power of a question, is affected by the way a question is stated. Each question, therefore, was varied by either changing numbers to letters, omitting the figure with the problem, omitting auxiliary construction lines, increasing the number of steps in the problem, or increasing the degree of abstraction. In this manner the questions were varied so that there were four variations for each question. These variations were rated 1, 2, 3, and 4, in order of increasing difficulty, by the writer and jury. By permuting the variations four tests were set up of comparable difficulty.

The 1430 freshmen students enrolled in the fall of 1956 at The Pennsylvania State University in engineering, chemistry and physics, mineral industries, and agricultural engineering were divided into groups and each group given one of the four tests. The 136 items, 4 variations on 34 questions, were analyzed in order to determine which would discriminate best between the student whose preparation was such that he could pass analytic geometry and the student who was not adequately prepared. For each item the following were computed: (1) difficulty, (2) tetrachoric, (3) item relationship, (4) the discriminative power based on the student s grade in analytic geometry, (5) the ability of the item to discriminate between the A and F students, (6) the ability of the item to discriminate between the C and F students, (7) the test of the significance of the difference in the per cent of C and the per cent of F students answering the item correctly, (8) profiles of the per cent of the students receiving an (A, B, C, D, F, or W) in analytic geometry who answered the item correctly.

As a result of this analysis 26 items were chosen. In order to round out the area content 9 new items were added. These 35 items became the questions in the General Mathematics Test, Form 5.

CONCLUSIONS: Preliminary estimates indicate that the General Mathematics Test, Form 5 will probably discriminate better between the C and F student

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than tests used previously. The reliability, by the Kuder-Richardson formula, is 0.82. The difference between the per cent of C and the per cent of F students answering correctly is significant at the 5% level for 15 of the chosen items. The difference between the per cent of A and the per cent of F students answering correctly is significant at the 5% level for 25 of the chosen items.

Analysis revealed that some of the students need: (1) more practice in using abstract symbols other than numbers, (2) a better understanding of definitions and relationships, (3) more experience in analyzing a problem and breaking it up into its component parts, (4) more experience in applying information to new situations, (5) more practice in making associations and in generalizing.